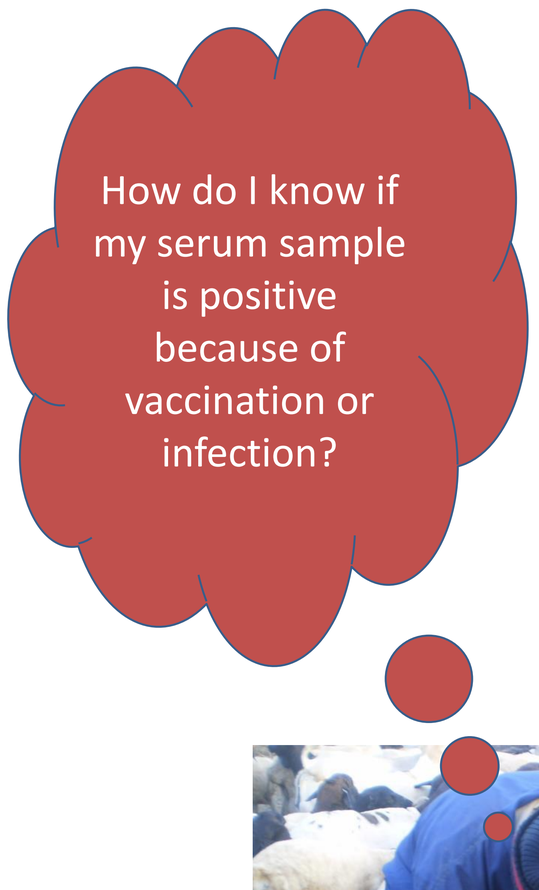
Importance of differentiating infected and vaccinated animals (DIVA) in outbreaks and the potential of Luminex-based fluorescence microsphere immunoassay for Rift Valley fever diagnosis

Johanna Lindahl[1], Izabela Ragan[2], Rachel Palinksi[2], Bernard Bett[1], William Wilson[3], and Raymond Rowland[1]
[1]*International Livestock Research Institute, Nairobi, Kenya*
[2]*Department of Diagnostic Medicine and Pathobiology, College of Veterinary Medicine , Manhattan, Kansas*
[3] *Arthropod-Borne Animal Diseases Research Unit, USDA, ARS, Manhattan, Kansas*

Rift Valley fever

- An emerging infectious disease with severe health and economic impacts in sub-Saharan Africa
- Zoonotic virus transmitted by mosquitoes of different genera, but also transmitted through contact with body fluids
- Outbreaks often occur after abnormal rainfalls and El Niño events
- Inter-epidemic period can vary between 5 and 10 years
- Morbidity and mortality among livestock can be high, especially in young animals
- Spillover into the human population causes fatal cases of haemorrhagic fever



Control

- Vaccination campaigns in animals often occur in high-risk areas or when an outbreak is occurring or is predicted.
- Vaccination is seldom continuous or covering all species and there are seldom enough animals protected by the next outbreak to provide herd immunity.
- When the next outbreak starts, there might be a mix of naturally infected, vaccinated and still naïve animals in the herds. This complicates sero-surveillance and early detection.

DIVA: what is it and why?

Differentiating Infected and Vaccinated Animals

Vaccination is often necessary to reduce the spread of infectious diseases, but it is a common dilemma that serological tests are not able to differentiate between animals that have been vaccinated and those that have been naturally infected.

Different solutions have been suggested for this, including the creation of vaccines that do not give immunity towards non-structural proteins, and then serological detection of that non-structural protein can be used for identification of real cases.

It may be possible to differentiate the epitopes that induce antibodies in vaccinated and infected animals. Luminex is a fluorescence microsphere immunoassay technology where microspheres can be coupled with different antigens and the profile of antibodies can be assessed.

Johanna Lindahl
J.Lindahl@cgiar.org ● Box 30709 Nairobi Kenya ● +254 20 422 3000 ● ilri.org